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MISCELLANEOUS STUDIES IN THE HENICOCEPHALIDÆ

(Hemiptera)

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The family Henicocephalidæ is one of the smaller families of the Hemiptera comprising some seventy-two species, both fossil and living. It has been placed in the first phalanx of the great predaceous superfamily Reduvioideæ. The group seems to be very primitive and is cosmopolitan in its distribution, being found on all of the main continents and on the major island groups with the exception of the Hawaiian Islands. The principle work on the group has been done by Dr. Bergroth, who published many papers describing nearly one-third of the living species. As early as 1893 Dr. Bergroth announced his intention of monographing the family and it is indeed regrettable that he was unable to do so. However, because of his familiarity with the group, the author has followed him in matters dealing with the validity of the genera as he had the material before him and was much more competent to judge than others who used different arrangements of the genera. Other major contributions have been made by Distant, Kirkaldy and Breddin. Bruner (1924) gave a list of the species but listed only thirty-two of the sixty-four living species known at that time.

The author is indebted to Mr. E. P. Van Duzee of the California Academy of Sciences for the loan of much material from the Academy collection, including the new species here described, as well as for his valuable aid in the preparation of this paper; to Dr. E. C. Van Dyke of the University of California for his generous assistance in many of the problems encountered; to Dr. H. M. Harris of the Iowa State Agricultural College for his comparison of one of the author's species with the Drake and Harris types, and to Mrs. Frieda Abernathy for the excellent plate.

Morphology

Specific differences in this family have been based mainly upon the shape of the head, pronotum and legs and to some extent upon color. To what extent these characters may be used is difficult to determine because of the difficulty of distinguishing the sexes of some species. Bergroth (1905) gives us a note concerning the distinguishing of the sexes which is very helpful. The author has not attempted sexual differentiation in *Systelloderus* as the genital segment in this genus apparently gives very little indication of the sex. The three appendages referred to by Bergroth were not observed in *Systelloderus* although they were readily discernible in *Henicocephalus*. Numerous and fresh examples which may be dissected are necessary to clear up this point. According to Bergroth's note the species described by Kirkaldy (1908) as *Henicocephalus corticicola* will probably prove to be the female of *H. fungicola* Kirk. described on the same page and from the same locality.

The rostrum is very primitive in the entire group. The labrum and maxillary palpi, of which it is composed, well indicated, very distinct in the primitive genera *Aenictopechys* and *Aerorchestes* and fused toward the base in *Gamostolus*. In *Systelloderus* the labrum is well indicated and tumid on the basal segment and the maxillary palpi are separated by a distinct longitudinal line apically. The rostrum is very broad at the base and comparatively robust throughout. In *Henicocephalus* [*formicina* (Uhl.)] the rostrum is more slender and fragile, fused toward the base and halved by a less distinct longitudinal line.

The wing venation has been described and figured by Kirby (1891), Kirkaldy (1901 and 1908), Breddin (1905), and Johannsen (1909). The author has referred to the above works in an effort to apply the Comstock system of uniform terminology to the veins and has figured the venation of the two North American genera to aid in their separation. As the tracheation of the wings has not been investigated the author may have fallen into error in the naming of some of the veins, but it is hoped that the attempt may encourage further work along this line. Sc in figure 1 appears to be merely the subcostal fold, but is considered here to be an indication of the subcostal vein

as it is found in another species, *H. maclachlani* Kirk. If this is not true, R of figures 1 and 2 probably represents a coalescence of the subcosta and radius. M + Cu, figure 1, actually appears double and is undoubtedly a coalescence of the media and cubitus. The small cross vein between A_{1+2} and the inner margin is not named but is present in most of the species figured and in all of the species which the author has examined.

The fore legs have long been used in the classification of this group and Bergroth (1915) speaking of some Asiatic *Henicocephalus* says of the hind legs: "The shape of the hind femora has not hitherto attracted the attention it deserves; it is in fact of importance as a specific character in this as well as in other groups of the genus."

Biology

Our rather scanty knowledge of the habits of the Henicocephalidæ has been accumulated through scattered references to collectors' notes very often at the time of description of the various species. Perhaps the most striking characteristic, as has been noted by Blanchard (1852) for *S. moschatus* Blanch., Berg (1879 and 1893) for *H. spurculus* Stål, Mr. Green (Kirby 1891) for *H. telescopicus* (Kirby), and by many observers in the United States and Mexico for *Hymenodectes culicus* Uhler = *S. biceps* (Say), is their habit of forming in large swarms and dancing up and down in the sunlight in what appears to be a nuptial flight, as they have often been taken in copulation. Authors observing this have likened them variously to Mosquitoes, Chironomidæ, Nemocera, and Ephemeridæ. Other records of the flight of these insects are by Schouteden (1905), who describes *H. cornifrons* from Belgian Congo; Blatchley (1926), who took *S. biceps* (Say) at Royal Palm Park, Florida; and the author, who has *S. biceps* (Say) taken by A. R. Park, Jr., at Urbana, Illinois, and *H. formicina* (Uhl.) from Berkeley, California, all taken at light.

However, they have more often been found on the ground under stones and débris or running among dead leaves in the forest where they may prey upon other insects to the best advantage. The following authors have observed this: Mr. Gravely (Distant, 1911) for *H. limbatipennis* Dist. in Ceylon, H. M. Harris (Drake and Harris, 1927) for *S. terrenus*

D. and H. in Iowa, and many authors in the United States for *S. biceps* (Say). Under the bark of dead trees Kirkaldy (1908) took *H. fungicola* Kirk. and *H. corticicola* in Fiji, Barber (in remarks after Knab, 1908) took *S. biceps* (Say) in Tennessee and Maryland, and C. J. Drake (Drake and Harris, 1927) took *S. inusitatus* D. and H. at Woodville, Mississippi.

Of the actual predaceous habits of these insects we have some exceedingly interesting records: Mally (1903) noted the paralyzing effect of the bite of a South African species which later was described (Distant, 1904) as *H. pugnatorius* Dist., F. A. Fenton (Drake and Harris, 1927) took *S. iowensis* D. and H. in a "concentration cage" where the species was feeding on the emerging adults of the Hessian Fly, *Mayetiola destructor* Say, at Onawa, Iowa. Perhaps the most interesting along this line, however, are the records of Bergroth to myrmecophagous species. Bergroth (1903) describes *H. braunsii* Bergr., taken by Dr. Brauns in the nest of *Rhoptromyrmex transversinodis* Mayr in Cape Colony. As the ant is much smaller than its guest and as the Henicocephali are predaceous, Bergroth expresses the opinion that the species is myrmecophagous. Bergroth (1915a) describes still another species, *H. myrmecophilus* Bergr., taken again by Dr. Brauns, also from the Cape of Good Hope. This species was taken in the nest of *Camponotus cognatus* Sm., an ant which is considerably larger than its guest, consequently Bergroth expresses the belief that this *Henicocephalus* preys upon the eggs and larvæ of the ant.

Finally an interesting observation is of the musky odor emitted by some of the species of this group. Those who have noted this are Blanchard (1852) for *S. moschatus* Blanch. (which was named for the above characteristic) in Chile, and Berg (1893) for *H. spurculus* Stål taken in the Garden of the Art Gallery, Buenos Ayres. Bergroth (1915a) ventures the opinion that *H. myrmecophilus* Bergr. is protected from the attacks of the ants by this odor.

Taxonomy

Phalanx Henicocephaliformes Reuter (1910)

Rostrum four-segmented. Prosternum without a stridulatory sulcus. Wings totally membranous, provided with longitudinal veins and a few transverse veinules.

The above has been modified from Reuter (1910), who described the rostrum as three-segmented. This phalanx may be separated from the phalanx Reduviiformes Reut. by the absence of the prosternal stridulatory sulcus and from the Nabiformes Reut. by the totally membranous wings.

Family HENICOCEPHALIDÆ Stål (1860)

Head constricted behind the eyes, except in *Aenictopechys* Breddin, the posterior lobe subglobose to transverse. Labrum and maxillary palpi more or less distinct. Antennæ four-segmented. Ocelli distinct, located anteriorly on the posterior lobe of the head, in bilobed genera. Metasternal orifices wanting. Anterior legs thickened, the tibiæ dilated apically.

The above has been very much modified from Reuter (1910) who apparently was unaware of Breddin's work. The family Enicocephalidæ was founded by Stål (1860) for Westwood's genus *Enicocephalus*. Later Stål (1865) emended this to its proper form Henicocephalida = Henicocephalidæ and it has been used almost universally in this form since that time. However, Van Duzee (1917), following his policy of using the original form of a name and leaving it to the individual to accept or reject the emendation as he wishes, revived the original form. Several recent authors have followed this, but this author accepts the emended form as it seems both permissible and desirable to do so.

KEY TO SUBFAMILIES

Pronotum roundly narrowing from base to apex, not divided by two deep transverse impressions into three lobes..... ..... *Aenictopechinæ* subfam. nov.

Pronotum divided by two deep transverse impressions into three lobes..... *Henicocephalinæ* Ashmead

Subfamily **Aenictopechinæ** subfam. nov.

Pronotum roundly narrowing from base to apex, not divided by transverse constrictions into three lobes.

Type *Aenictopechys* Breddin (1905)

This subfamily is proposed for the reception of *Aenictopechys* Breddin (1905) and *Gamostolus* Bergroth (1927). Neither of these genera agree with the family Henicocephalidæ as formerly understood, so the scope of the family has been enlarged and the genera are segregated into two subfamilies, according to whether the pronotum is trilobed or entire.

KEY TO THE GENERA OF AENICTOPECHINÆ subfam. nov.

Head scarcely longer than wide, without a transverse impression behind the eyes. Venation very simple, the veins not reaching apex of wing ..... *Aenictopechys* Breddin

Basal lobe of head well defined anteriorly by a transverse impression. Venation as in *Henicocephalus* Westwood..... ..... *Gamostolus* Bergroth

Subfamily HENICOCEPHALINÆ Ashmead (1893)

Pronotum divided by two transverse impressions into three lobes.

Type *Henicocephalus* Westwood (1837)

This subfamily is the family Henicocephalidæ as treated by most authors, and most references to the family Henicocephalidæ should be referred to this subfamily which was originally proposed under the Reduviidæ.

KEY TO THE GENERA OF HENICOCEPHALINÆ Ashmead

1. Discal cell closed, fig. 1 (except in *H. maclachlani* Kirk. and *H. myrmecophilus* Bergr.) As a rule larger and darker species, strongly pilose..... 2
—. Discal cell open, fig. 2..... 3
2. Eyes normal, fairly large but not contiguous above or below .....*Henicocephalus* Westwood
—. Eyes greatly enlarged. Contiguous both above and below throughout all their length. Occupying almost the whole head.....*Cocles* Bergroth
3. Pronotum divided into six lobes. Fore-coxal cavities closed behind. Intermediate and hind tarsi one-segmented..... ..... *Aerorchestes* Bergroth
—. Pronotum divided into three lobes, sometimes appearing four-lobed if the longitudinal impression is deep on the intermediate lobe. Fore-coxal cavities open behind. Intermediate and hind tarsi two-segmented.....*Systelloderus* Blanchard

Our two North American genera are next briefly characterized and two new species are described in *Systelloderus*.

Genus SYSTELLODERUS Blanchard (1852)

Very small glabrous species. Discal cell open (fig. 2). Pronotum rather robust, not so abruptly narrowing apically as in some *Henicocephalus*. Fore-coxal cavities open behind. Anterior tarsi one-segmented, intermediate and hind tarsi two-segmented. Tarsi with two long claws. Posterior lobe of head subglobose.

Genotype *Systelloderus moschatus* Blanchard

The genus *Systelloderus* comprises a natural group of closely

allied species which may conveniently be separated from the extremely variable *Henicocephalus*. Dr. Bergroth (1915a) says, "Under the described *Henicocephalus* there are, indeed, some very small and glabrous species, in which the discoidal cell is lacking, but these belong to the genus *Systelloderes* Blanch. (= *Henschiella* Horv. and *Hymenodectes* Uhl.), which is very different from the genus *Henicocephalus*, as I shall set forth in a later work."

The genus *Systelloderes* was first emended to its correct Latin form by Walker (1873), who considered it a synonym of *Henicocephalus*. He was followed by Bergroth (1889) and also by Karsch (1892), who considered it a subgenus of *Henicocephalus*. Lethierry and Severin (1896), considering the genus a synonym of *Henicocephalus*, also used the correct form but were "corrected" by Kirkaldy (1901). The original form was then used by Bergroth and others until Van Duzee (1917) used the Latin form. In this he was corrected by Parshley [1]. Drake and Harris (1927) used the Latin form, and it is used in this work as it is a permissible emendation according to the Entomological Code.

Systelloderus crassatus Usinger, n. sp., Fig. 6

Near *S. angustatus* (Champion 1898) but lighter, fusco-testaceous, the rostrum, legs, antennæ, and anterior and intermediate lobes of pronotum testaceous. Front femora more incrassate than in either *angustatus* (Champ.) or *iowensis* D. and H., thicker than width of posterior lobe of head.

Rather thickly pilose, shining; head longer than pronotum; posterior lobe subglobose, more nearly parallel-sided than in other species, measured from anterior to posterior constriction slightly longer than broad, 6:5.5; length and width equal in *angustatus*, length distinctly less than width in *biceps* (fig. 5); width of posterior lobe equal to, or slightly less than, width of anterior part including eyes. Antennæ about as long as head and half the pronotum; first segment stouter and shorter than the rest, second somewhat thickened and infuscated apically; proportional length of segments I:II:III:IV::6.5:14:14:12. Pronotum as long as broad; feebly emarginate in front, shallowly and roundly emarginate on the posterior border; a distinct median sulcus deep on the intermediate lobe and indicated on all three lobes; intermediate lobe (measured along lateral

1 Science, N. S., XLVII, No. 1212, p. 293, 1918.

margin) longer than posterior lobe, 6::5; anterior lobe distinctly broader than basal lobe of head, a little more than half the width of intermediate lobe which is slightly narrower than the posterior. Scutellum carinate apically; length and width subequal. Wings exceeding the tip of the abdomen; discal cell open. Anterior femora greatly incrassate, thicker than width of posterior lobe of head, 6::5.5; a little more than twice as long as broad. Anterior tibiæ shorter than femora, widened and flattened apically with seven sharp spines at the inner apical angle, a little more than twice as long as broad. Tarsi with two long claws. Posterior femora also greatly incrassate; almost as thick, although not so robust, as anterior femora; a little over twice as long as broad.

Color testaceous; faintly infuscated on the anterior lobe of the head and on the thickened portion of second antennal segment, more pronounced on the roughened posterior lobe of the pronotum; intermediate and hind legs and venter stramineous.

Length, 3.25 to 3.58 mm.; width, .16 mm.

Type No. 3621, Mus. Calif. Acad. Sci., collected by J. O. Martin at Palm Springs, California, on March 26, 1917. Paratype, same data as the type, in the Academy collection.

Dr. Halbert M. Harris has very kindly compared *crassatus* with *iowensis* D. and H., which is likewise very near *angustatus* (Champ.), and gives the following notes. "*Systelloderus crassatus* Usinger (*ms*) differs from species described by Drake and Harris in having a longer, more parallel-sided posterior lobe of head, longer pronotum, and more strongly incrassate fore femora. In *iowensis* the depth of the front femora as compared to width of posterior lobe of head is in ratio, femora: head :: 11:13; in *crassatus* the ratio is 14:13."

Systelloderus nitidus Usinger, n. sp., Fig. 4

Smooth, shining; testaceous to fuscous; sparsely clothed with short hairs. Head longer than pronotum; posterior lobe broader than long, 4::5, and subequal in width to anterior lobe including eyes, subquadrate, constricted behind to form a short neck. Antennæ about as long as head with the anterior and intermediate lobes of pronotum; first segment shortest, stout, second slightly clavate, third filiform, fourth fusiform; proportional length of segments I:II:III: IV::5:10:9:9. Rostrum stout, very little shorter than head. Pronotum slightly broader than long, 19::16, narrowed anteriorly; length equal to width of intermediate lobe; anterior and intermediate lobes smooth, shining; anterior lobe slightly wider than posterior lobe of head, its anterior margin deeply emarginate, its length (median measurement) subequal to that of posterior lobe, one-third that of intermediate lobe; intermediate lobe (measured along lateral

margin) slightly longer than posterior lobe, divided into two subovaL lobes by a median longitudinal impression that is distinct anteriorly, obscure or wanting posteriorly, its posterior margin overlapping anterior margin of posterior lobe; posterior lobe with a sulcus very deeply impressed behind the postero-lateral angles of the intermediate lobe, less deeply impressed and concavely sinuate at the middle; posterior lobe lightly roughened, its posterior margin shallowly but distinctly emarginate. Scutellum broader than long, abruptly and distinctly carinate on its apical one-third. Wings exceeding the tip of the abdomen; discal cell open (fig. 2). Anterior legs stout, laterally compressed; femora not so thick as width of posterior lobe of head, 4::5, a little more than two and one-half times as long as broad; tibiæ strongly dilated apically, a little more than twice as long as broad, the inner apical angles bearing several sharp spines; tarsi with two sharp recurved claws. Intermediate and hind legs slender except for the posterior femora which are moderately incrassate.

Color flavous, the sides of, or often the entire posterior lobe of head faintly infuscated. Anterior lobe of head fuscous, becoming lighter anteriorly; rostrum testaceous to pale fuscous; eyes fusco-rufous, ocelli red. Antennæ varying from uniformly pale testaceous to a fuscous first segment, flavous second segment, and stramineous to white third and fourth segments in fully pigmented specimens. Scutellum often with a median basal spot, ivory-white. Venter white.

Length, 2.25 to 2.5 mm.

Type No. 3622, Mus. Calif. Acad. Sci., collected by R. H. Painter at Puerto Castilla, Honduras, April 20, 1926. Seventeen paratypes, same data as type, in collection of California Academy of Sciences, U. S. National Museum, C. J. Drake, and the author.

Genus Henicocephalus Westwood (1837)

As a rule, larger species than in *Systelloderus* Blanch., darker and rather thickly pilose. Posterior lobe of head transverse to globose. Pronotum divided into three lobes. Discal cell closed (fig. 1). Forecoxal cavities open behind. Anterior tarsi one-segmented, intermediate and hind tarsi two-segmented. Tarsi bearing one or two claws.

Genotype *Henicocephalus flavicollis* Westwood

An extremely variable group of species two of which (*H. maclachlani* Kirk. and *H. myrmecophilus* Bergr.) have the discal cell open as in *Systelloderus*. Others (*H. basalis* Westw., *H. robustus* Dist., *H. dubius* Jeannel, and perhaps others) have the robust pronotum found in *Systelloderus*. The number of claws varies, depending upon the species, *H. pilosus* Champ.,

H. emarginatus Champ., and *H. flavicollis* Westw. having only one claw.

Our single North American species is figured (fig. 3).

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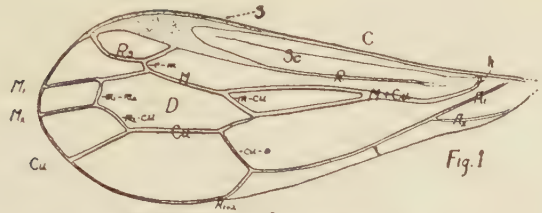

Fig. 1

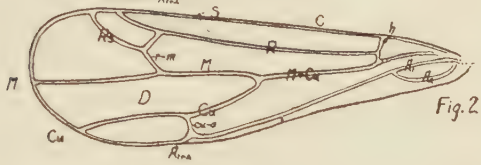

Fig. 2

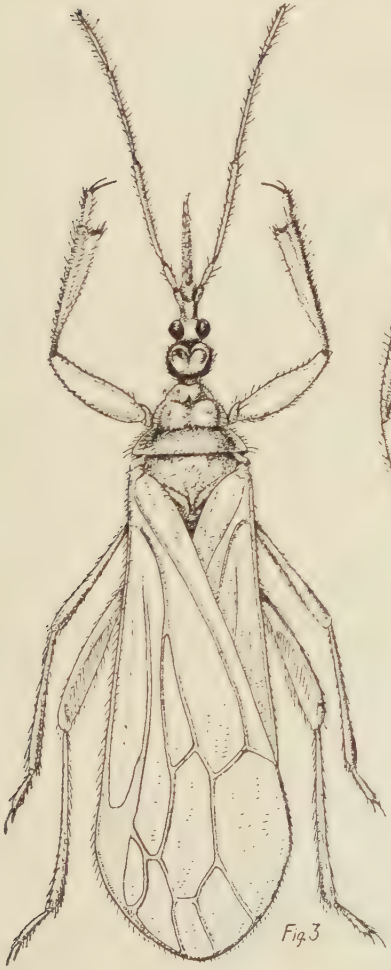

Fig. 3

Fig. 4

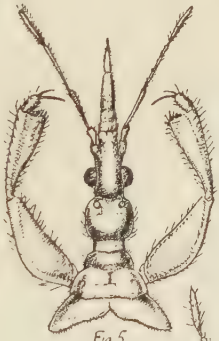

Fig. 5

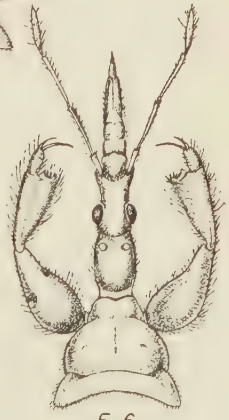

Fig. 6

Explanation of plate on page 156.

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Explanation of Plate

Figure 1. Front wing of *Henicocephalus formicina* (Uhl.). Neural nomenclature after Comstock: C = Costa; Sc = Subcosta; R = Radius; A = Anal; h = Humeral Cross-vein; S = Stigma; D = Discal Cell.
Figure 2. Front wing of *Systelloderus nitidus* n. sp.
Figure 3. *Henicocephalus formicina* (Uhl.) from a topotype, Griffith Park, Los Angeles, California, December 24, 1930, taken by E. C. Van Dyke.
Figure 4. *Systelloderus nitidus* n. sp. The holotype is figured.
Figure 5. *Systelloderus biceps* (Say) from a topotype, St. Vincent, Pennsylvania, in the E. P. Van Duzee collection.
Figure 6. *Systelloderus crassatus* n. sp. The holotype is figured.

Ephestia Kuehniella Fuscofasciella Rag. in California

J.M.R.V

is sabiniana

The loose bark on dead Digger Pine trees and stumps in the Sierra foothills is utilized by woodpeckers for the storage of acorns. Throughout the winter, and perhaps all year around, larvæ of the above-mentioned moth may be found working on these acorns. The writer accidentally collected some of these larvæ in March, 1928, near Oroville. In January, 1931, a deliberate attempt to obtain specimens just below Shingle Springs, El Dorado County, was very successful.

The adults of this variety average slightly larger (22 to 24 mm.) than specimens of the typical species on hand, and are darker, lacking the pinkish tinge found on the fore wings of the latter. The antemedian white fascia edged outwardly with fuscous is the most conspicuous wing feature. The larvæ are large, fat, and pinkish.

As well as on acorns, complete life cycles were induced on almonds and raisins, showing this moth to have the same potentialities as the typical species. This occurrence is of interest as an illustration of a storage pest in nature without man's agency. Mr. Carl Heinrich, United States Bureau of Entomology, determined the species.—H. H. Keifer, California Department of Agriculture, Sacramento, California.

AN UNDESCRIBED WATER-STRIDER FROM HONDURAS

(Hemiptera, Gerridæ)

BY C. J. DRAKE AND H. M. HARRIS
Ames, Iowa

Rheumatobates clanis Drake and Harris, n. sp.

Apterous male. Small, velvety black with yellowish markings. Head broad, with a more or less distinct, concavely arcuate, fulvous line on base. Antennæ simple, moderately long, slender, clothed with a few bristly hairs; black, the basal portion of segment I testaceous; formula, 27:8:11:17. Rostrum shiny black, stout, extending between intermediate legs.

Anterior legs stout, clothed with long hairs, the femora beset along posterior margin beneath with numerous long seta- or spine-like hairs; tibiæ stout, broadened distally, the apex strongly and bluntly produced at outer margin; tarsi broad, slightly curved. Intermediate legs very long, the femur within with longer hairs; formula, femur, tibia, tarsus, 105:95:68. Hind legs rather short, the femora clothed within with a few long hairs; formula, 65:42:16.

Pronotum short, with a median impressed longitudinal line; velvety black, the median portion usually flavous, the sides strongly produced posteriorly. Mesonotum broader than long, faintly widened posteriorly, with a distinct median line; black, usually with an elongate flavous patch near the center and two fulvous spots on each side. Abdomen black, the connexivum broad; last tergite about one and a half times as long as the preceding. Venter black, the last segment nearly as long as the preceding two. Genital segments elongate, the second narrower and longer than the preceding, its hind margin with a few longer hairs.

Length, 2.38 mm.; width, 1.00 mm.

Apterous female. Larger and broader than male, the pale markings usually larger and more conspicuous. Head as in male, the eyes reddish black to black. Rostrum and antennæ colored as in male, formula of the latter, 20:8:13:18. Anterior legs rather stout, hairy, with a few longer hairs; black, the femora paler on basal half and beneath; tibiæ becoming broader apically; tarsi broad and stout, produced as in male. Intermediate legs very long, slender; formula, 108:98:72. Posterior legs black, yellowish at base, with a few long hairs on femur; formula, 70:42:17. Pronotum as in male, the pale spot larger and the hind margin convexly rounded. Mesonotum broader than long, median line rather indistinct, the pale markings larger and more prominent than in male. Abdomen black; the connexivum broad, usually margined with yellowish to fulvous, distinctly produced beyond apex of last tergite. Venter black, frequently paler apically, the last segment shorter than the two preceding ones and

broadly emarginate behind. First genital segment black, large, the sides parallel to near the middle, thence strongly narrowed; with a large fulvous median spot and numerous long, black, seta-like hairs above; beneath, flattened, the ovipositor extremely long and stout.

Length, 3.17 mm.; width, 1.17 mm.

Holotype, apterous male and *allotype,* apterous female, Rio Grande, British Honduras, in collection of authors. *Paratypes,* 350 males and females taken with types; in collections of California Academy of Science and the authors. The unmodified antennæ and legs and the strongly and backwardly produced sides of prothorax readily separate this species from all known members of the genus. The types were taken in company with *Telmatometra whitei* Bergroth, *Potamobates horvathi* Esaki and *Rhagovelia calopa* D. and H. As in other members of the genus the color markings are quite variable, the yellowish markings being very pronounced in some individuals and entirely lacking in others. The alate form is unknown.

A NEW BUTTERFLY RECORD FOR CALIFORNIA

(Phyciodes tharos Drury)

BY J. D. GUNDER

Pasadena, California

During the fore part of October (October 3) in 1923, while collecting lepidoptera in Imperial Valley, I took a series of eighteen or twenty specimens of *Phyciodes* in both sexes. These were taken along the fences on the main highway between Brawley and El Centro, nearer Brawley. Along the wire fences and the few uncultivated nooks to be found in that region, there grows a mass of wild flowers and vegetation which, of course, is not all native. These butterflies were found mostly along the fences, but a few were also found along the ditches as well. Since 1923 other collectors have taken the same species in the same general region, but their identity has remained more or less uncertain. Recently I sent the entire lot which was originally collected to Mr. Foster H. Benjamin of the United States National Museum and he has identified them as *Phyciodes tharos* Dru., stating that they are not atypical in his opinion. This common eastern species has evidently been introduced into Imperial Valley and it can now be added to California lists. A series has been placed in the Barnes collection at Washington as a matter of record.

DIPHYLLOSTOMA: A THIRD SPECIES

(Coleoptera)

BY H. C. FALL

Tyngsboro, Massachusetts

The observations of Mr. Hinton and Dr. Van Dyke (Pan-Pac. Ent., VII, 1930, p. 95), followed by Mr. E. Gorton Linsley's paper in the January 1932 issue of the same magazine, show that specimens of this interesting genus have recently been taken in numbers by several collectors.

Mr. Linsley's article is notable in that it records the first capture of the female, a desideratum of thirty years' standing. As I had anticipated, it proves to be apterous, and exhibits such differences from the male as the heavier body not entirely covered by the elytra, smaller eyes and shorter legs, more or less characteristic of wingless females in a number of other genera of coleoptera. It does not yet appear whether the female is strictly epigeal nor is anything yet known as to the feeding habits of either sex, if indeed they take food in the imago state; an interesting problem for the field naturalist.

Mr. Linsley gives the following table, based on male characters, for the separation of the "two known species."

Mandibles strongly emarginate at tip; suborbital plates prominent; unicolorous, dark brown; 6 to 8 mm. Tulare County, California ..... *fimbriata* (Fall)

Mandibles evenly rounded; suborbital plate inconspicuous; bicolored, prothorax piceous, elytra brownish; 5 to 9 mm. Middle Sierra Nevada Mountains, California..... *nigricollis* Fall

It is clear that the diagnostic characters of the *nigricollis* of the above scheme were drawn from his Riverton specimens, which not unnaturally were assumed to be that species, the resemblance being exceedingly close. My suspicions as to the correctness of this reference were first aroused by the statement that the mandibular process is evenly rounded. This I find to be uniformly true in a considerable series of the Riverton species kindly sent me by Linsley, but it is not true of any example of the type series of *nigricollis* in all of which the mandibles are emarginate, though less deeply so than in *fimbriata*. Moreover what Linsley calls the suborbital plates, and which I re-

ferred to as the tempora in my original description of *fimbriata,* are present, though very small, in *nigricollis,* while they are as a rule almost wholly obsolete in the Riverton examples. The locality—"Middle Sierras"—also applies to Riverton (El Dorado County) but not to Fresno and Tulare counties, some one hundred fifty to two hundred miles farther south, the known habitat of *nigricollis.* In this connection it need hardly be said that a much less distance may be amply sufficient for the complete isolation of two allied species provided the females are apterous, as is well illustrated in the genus *Pleocoma.*

A further study of the genitalia of *nigricollis* and the Riverton form demonstrates the significance of the small external differences noted and shows conclusively that we have to do with two distinct species. The following diagrammatic sketches show with sufficient accuracy the genital differences in our three species. The lateral lobes, especially, are more or less warped in all the species and cannot be adequately shown in a single outline drawing, but for comparative purposes all have been made as nearly as possible from the same lateral viewpoint.

Right (R), middle (M), and left (L) lobes of the male genitalia of *Diphyllostoma fimbriata, D. nigricollis and D. linsleyi* n. sp., as viewed horizontally from the left side.

Diphyllostoma linsleyi Fall, n. sp.

Nearly identical in size and general aspect with *nigricollis.* As in the latter the head and prothorax are black or piceous, the elytra brownish, the prothorax finely punctate, the hind tarsi a little longer, slightly more slender and with perceptibly larger claws than in *fimbriata.* It differs from both *nigricollis* and *fimbriata* in having the mandibular process evenly rounded in front and in the nearly or quite obsolete postocular tempora, and also in the form of the male genitalia (see figures).

Described from a good series of specimens, all males, taken at Riverton, El Dorado County, California, by Mr. E. Gorton Linsley of Oakland, California, to whom the species is dedicated in recognition of his contribution to our knowledge of this remarkable genus. The type is in my own collection and bears date July 5, 1931.

According to Linsley the differences between *fimbriata* and *nigricollis* in surface sculpture and in the length of the tarsi noted in my original description of the latter disappear in a series. Although his statement is somewhat weakened from the fact that he made it with *linsleyi* rather than *nigricollis* in hand, still these two species are so nearly identical in these respects that it should apply about equally well to *nigricollis*. The differences in sculpture were so small that I can readily believe they might not hold in a large series. As to the tarsal character I can only say that I have yet to see an example of either *nigricollis* or *linsleyi* in which the hind tarsi are not perceptibly longer than in *fimbriata*, so that I can hardly doubt that this difference will prove quite characteristic when series are taken as a whole.

The Vespula Marginata of Kirby

In Dr. J. Bequaert's excellent revision of the American Vespinæ, he describes *Vespula norwegica* var. *marginata* (Kirby), based on *Vespula marginata* Kirby, 1837. This is a wasp of the Hudsonian Zone from Alaska to Labrador. Unfortunately the name is preoccupied by *Vespa marginata* Gmelin, 1790. This leaves us apparently with the disagreeable necessity of calling our wasp *Vespula norwegica peruana* (H. de Saussure, 1868). This was described from "Quito, Peru." Now, Quito is not in Peru but in Ecuador; and, as Dr. Bequaert remarks, there must apparently have been a mistake in labeling. I say "apparently," because I noticed when in Peru that much Oregon lumber was imported into that country, and it is not impossible that a Vespula might appear in South America, having emerged from some hole in the lumber in which it had taken refuge.—T. D. A. Cockerell.

THE CALIFORNIA SALMON FLY

BY E. O. ESSIG

The California salmon fly, *Pteronarcys californica* Newport, is one of the most conspicuous and interesting insects in many parts of California, but more particularly in the northern reaches of the Great Valley where it occurs in the Sacramento, McCloud, and Pit rivers and their tributaries. The larvæ live on the bottoms of swift areas of the streams and the nymphs crawl out on rocks, shrubs and trees along the banks, and their clinging skins testify to the transformation to the adults, which often appear in very great numbers.

The emergence period usually occupies two or three weeks during the month of May. On May 19, 1929, F. H. Wymore and the writer found the insect very abundant on the Pit River and Burney Creek, at which time they were being extensively and successfully used by fishermen to catch trout in those streams. A week ago I again had an opportunity to witness an emergence of this same insect—this time on the Sacramento River, in the vicinities of Castella, Castle Crag, and Dunsmuir. I passed through this district at noon on May 9, 1932, and observed the first adults in flight about forty-seven miles north of Redding at a short distance below a place known as Flume Creek. Their numbers increased northwardly and they were most abundant between Castella and Castle Crag. They gradually decreased toward Dunsmuir, above which no more were observed. The adults have a rather slow, awkward flight without any ability to dodge, and are killed by the thousands by automobiles. The emergence flight is for mating, the males and females alighting most often on tree trunks, where great numbers were to be observed copulating. On my return three days later, no apparent diminution in numbers was noted.

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A NEW SUBSPECIES OF TRICHOPHTHALMA FROM WESTERN AUSTRALIA

(Diptera, Nemestrinidæ)

BY J. BEQUAERT

Harvard Medical School, Boston, Massachusetts

Although the Australasian region is unusually rich in Nemestrinidæ—forty-one distinct forms being reported by Mackerras in 1925—only six species were known thus far for western Australia, viz., *Trichophthalma costalis* subsp. *apicalis* Mackerras, *T. fulva* Walker, *T. ruficosta* Mackerras, *T. leucophæa* Walker, *T. longirostris* Mackerras, and *T. grisea* Mackerras. All these came from the southwest division and mostly from the districts about King George's Sound and Perth. Obviously, as Mackerras points out, the scantiness of records from that part of the Continent is merely due to insufficient collecting.

During their brief stay in southwestern Australia, from September to November, 1931, the Harvard Australian Expedition obtained six specimens of Nemestrinidæ, representing two species of *Trichophthalma*. Of *T. costalis* subsp. *apicalis* Mackerras, two males were taken at Bridgetown (33° 56′ S.; 116° 8′ E.) on November 9, 1931, by Dr. W. M. Wheeler. These insects were visiting flowers of a small species of *Xanthorrhœa*, growing along roadsides in farmland country. The race differs conspicuously, in the male at any rate, from typical *T. costalis* Westwood, of eastern Australia, in the peculiar coloration of the wing, the apical third being clear white, sharply contrasting with the smoky remainder. It is of interest that Professor Wheeler collected, in the same locality and the same day, two specimens of a bombyliid which in size and coloration of body and wing exactly mimics this nemestrinid.

The other *Trichophthalma* appears to be undescribed, although it is evidently the western representative of *T. bivittata* Westwood. Notwithstanding certain slight structural differences, it seems more rational to give it subspecific, rather than specific rank, since it can hardly be doubted that the eastern *bivittata* and the new western form sprang from some common ancestor.

Trichophthalma bivittata wheeleri Bequaert, n. subsp.

Holotype and paratype female, and allotype and paratype male from Mullewa (28° 29′ S.; 115° 26′ E.), in the sand-plain region of southwestern Australia, September 14 and 18, 1931, at flowers (possibly of *Leptospermum*) (W. M. Wheeler). According to Dr. Wheeler, Mr. L. J. Newman of Perth collected additional specimens in the same locality.

A large, thick-set fly, superficially resembling *T. bivittata* Westwood, being grayish white, with a broad black median stripe over thorax and abdomen, partial black lateral stripes on the thorax, and broad black side margins on the abdomen; white stripes of abdomen more regular than in typical *bivittata* and with more woolly, somewhat matted white hairs; underside of body white.

Female. Integument of body black. Antennæ, palpi, labrum of proboscis and legs clove brown; hind tibiæ and tarsi slightly infuscate; pulvilli bright reddish yellow, with black tips.

Body moderately pilose above, very densely covered with longer hairs on the ventral side. Vertex with erect black hairs as far down as the anterior ocellus; remainder of head (including the beard) with white pile, with an admixture of black or gray hairs, especially on the upper half of the frons and on the middle of the face. Eyes densely covered with almost russet pile, except in the lower third where the hairs are sparser and white. Dorsum of thorax with moderately long and rather sparse, erect, grayish pile, mixed with black; the hairs along the sides of the dorsum and on the hind margin of the scutellum considerably longer and denser, grayish white, mixed with black ones apicad of the wings; pleura and pectus densely covered with long, grayish white pile. Abdomen with erect, black hairs on the black areas; the two broad white bands, however, covered with much longer, grayish white hairs, which are woolly and somewhat matted down; venter with long, white, appressed hairs. Femora with long, white pile; tibiæ and tarsi with very short, sparse, somewhat russet hairs. The integument is entirely covered with dull pruinosity, which is almost everywhere ashy gray, except on the conspicuous longitudinal black bands of the dorsum of thorax and abdomen. On the thorax a nearly uniform, moderately wide, black band runs over the middle of the dorsum from the anterior margin to the hind margin of the scutellum; in its anterior half it is flanked on each side by a slightly narrower, curved, black stripe, which begins at the shoulder, is broadly interrupted before the transverse suture, and stops before the base of the wing; there is also an indication of a dull black area in the extreme hind corner, close to the sides of the scutellum. On the abdomen, the median black stripe continues that of the thorax, but is nearly twice as wide, narrower posteriorly; on most segments it is fairly parallel-sided, but on the third tergite it is much narrower at the anterior margin; the

lateral black stripe on each side follows closely the side margin, being about as wide as the median stripe, and its line of demarcation from the white submedian stripe is fairly straight; the median and the two lateral black stripes unite along the hind margin of the fifth tergite, the following tergites as well as the ovipositor being dull black.

Head large, slightly flattened, as broad as the thorax, semi-eliptical in profile; kidney-shaped seen in front, the height about four-fifths of the width. Frons flat, moderately wide; inner orbits converging upward from the insertion of the antennæ (where the frons measures slightly over one-half of the width of the eye at that level) to halfway up the frons; its upper part and the vertex with subparallel sides and slightly less than half as wide as at the antennæ; sides of face strongly divergent downward. Ocellar protuberance elongate and low, scarcely set off, with a faint median depression; ocelli placed in an isosceles triangle, the posterior ocelli less than half as far apart as from the anterior ocellus. Antennæ moderately long, placed on the sides of the face, close to the lower orbits; basal segment slightly broader than long, truncate at apex; second very short and wide; third flattened, awl-shaped, with a deep but narrow constriction close to the base, apparently setting off a narrow ring or collar-like supernumerary segment; its basal third with subparallel sides, then rather rapidly narrowed to a blunt point which continues into the three-jointed style; style slightly shorter than the antennæ, the basal two divisions long, though together shorter than the third, the first division shorter than the second. Face moderately swollen, its sides separated from the inner orbits by deep but narrow grooves; its upper median portion forming a wedge in the frons above the antennal pits. Proboscis of medium length, directed downward; measured along the labrum it is slightly less than the height of the head; labella large and thick. Palpi short, of normal thickness, protruding but little from the pilosity of the face; the second segment small, not swollen and without noticeable apical pit. Body very broad and thickset, somewhat flattened dorso-ventrally. Thorax distinctly broader than thick; the dorsum about as wide as long; the transverse suture marked on the sides only over about one-fourth of the width of the dorsum. Scutellum large, semi-elliptical, cushion-shaped; the swollen hind margin slightly set off by a depressed line. Abdomen broad and flat. Valves of ovipositor flattened and leaf-like; the lower edge strongly convex. Legs moderately long and stout; hind tibiæ and tarsi slightly thicker than those of fore and mid legs.

Wings slightly shorter than the body, over three times as long as wide, practically hyaline throughout; the veins dark clove brown. Venation of the typical *Trichophthalma* type, showing only minor differences from that of *T. bivittata* or *T. rosea*; these differences being due only to individual variation and therefore not of specific value. As in the two species mentioned, the apical portion of the

upper branch of the fifth longitudinal vein ($M_3 + _4$) is not in line with the remainder of the diagonal vein, but placed considerably more basad.

Length, not including ovipositor (to apex of tergite 5), 16.5 mm.; greatest width of abdomen, 7 to 7.5 mm.; length of labrum of proboscis, 4 mm.; length of wing, 16 mm.; width of wing, 4 to 4.3 mm.

Male. In most respects similar to the female. Eyes with longer pile, holoptic in the upper half of the frons; inner orbits touching each other over about half the distance between the anterior ocellus and the antennal pits (over more than twice the length of the upper, free part of the vertex).

Total length, 16.5 mm.; greatest width of abdomen, 5.5 mm.; length of labrum of proboscis, 4 mm.; length of wing, 15 mm.; width of wing, 4 mm.

This insect is evidently the western race of *T. bivittata* Westwood (= *T. eques* Schiner) of Queensland and New South Wales. I have compared it with two females of typical *bivittata* from Herberton, Queensland, and with one male of that form from National Park, New South Wales. In both sexes of typical *bivittata* the two white longitudinal bands of the abdomen have irregular, jagged outer margins and are covered with sparser, erect, grayish white pile; in the female the upper part of the frons and the vertex are distinctly narrower than in the subsp. *wheeleri* (about one-third of the width of the frons at the insertion of the antennæ); while in the male the inner orbits touch each other over a shorter distance (about equal to the length of the upper, free portion of the vertex).

Mr. F. W. Edwards, who very kindly examined for me Westwood's type at the British Museum, writes me that it is a female agreeing exactly in regard to the form of the abdominal white stripes and the abdominal hairs with specimens of eastern Australia received from Mackerras as *T. eques* Schiner. No definite locality was mentioned in the original description of *T. bivittata,* but since the type was given to Westwood by Shuckard, it came evidently from New South Wales, whence Shuckard about that time described several Hymenoptera.

It may be noted that the discovery of *T. bivittata wheeleri* at Mullewa extends the known distribution of the Nemestrinidæ considerably farther north in the western half of Australia.

A NEW PREDACEOUS GALL MIDGE FOR CALIFORNIA

BY DR. E. P. FELT

Bartlett Tree Research Laboratories, Stamford, Connecticut

A number of flies were received under date of May 10, 1928, from Harold Compere of the Citrus Experiment Station, Riverside, California, accompanied by the statement that the original stock was collected by him in Syndey, New South Wales, and that the material submitted for determination was propagated at Riverside, California, on *Pseudococcus gahani* and appeared like an important natural enemy of mealybugs. The entire rearing, consisting of nearly forty flies, all belong to the same species. Mr. Compere stated that it was suspected that the insect was *Diplosis koebelei* Skuse MS., a species included in Mr. Koebele's "Studies of Parasitic and Predaceous Insects in New Zealand, Australia, and Adjacent Islands" made by permission of the Secretary of Agriculture and at the request of the California State Board of Horticulture. This appeared in Report 51, United States Department of Agriculture, 1893, pages 38-39. There is no description of the insect in this report, though a number of interesting biological data are recorded. There is a brief note by Smith and Compere in relation to this introduced insect under the name *Diplosis,* in the *Journal of Economic Entomology,* Volume 21, page 668, 1928. The life cycle is completed in twelve days.

Later information, received through the courtesy of Mr. Harry S. Smith of the Citrus Experiment Station, Riverside, California, indicates that this insect multiplied abundantly on *Pseudococcus gahani* in cages and that apparently it has become permanently established in California, though its influence is negligible. The adults hang by dozens on spider webs, a habit recorded for a number of gall midges.

Silvestrina koebelei Felt, n. sp.

This species is distinguished from the generic type, *S. silvestrii* Kieffer, by the longer antennæ (in *silvestrii* they reach only to the middle of the abdomen), and by the longer antennal segments in the female (they have a length in *silvestrii* of less than twice the diameter), by the somewhat longer stem of the

segments (those in *silvestrii* being about one-fourth the length of the enlargement), and also by the lack of a large fuscous spot basally on the dorsum of the abdomen. *S. silvestrii* is recorded as preying upon *Diaspis pentagona,* and has been reported from Cape Town and Brazil.

Male. Length, 1 mm. Antennæ about one-fourth longer than the body, thickly haired, pale yellowish; fourteen segments, the fifth binodose, almost trinodose, with the stems one and one-fourth and one and one-half their diameters respectively; the basal enlargement oblate, the distal distinctly constricted at the basal third and with a length one-half greater than its diameter; the circumfilum with thick, stout loops, the basal circumfilum extending only to the tip of the basal enlargement, the loops of the middle circumfilum extending just beyond the constriction of the distal enlargement, and those of the distal circumfilum reaching almost to the tip of the segment. Palpi: the first and second segments short, stout, the third and fourth distinctly longer, each with a length about one-half greater than its diameter. Mesonotum yellowish brown. Scutellum and postscutellum a light fuscous yellowish. Abdomen a fuscous whitish. Wings hyaline, the third vein uniting at or slightly before the tip of the wing, the fifth vein joining the posterior margin at the distal fourth, its branch at the basal third. Halteres yellowish. Coxæ and femora mostly pale yellowish, the distal portion of femora, tibiæ and tarsi fuscous yellowish. Claws simple, strongly curved, pulvilli rudimentary. Genitalia: basal clasp segment rather long, stout; terminal clasp segment stout, tapering; dorsal plate deeply and triangularly emarginate, the lobes triangular; ventral plate broad and broadly rounded apically.

Female. Length, 1 mm. Antennæ probably nearly as long as the body, sparsely haired, fuscous yellowish, the basal segments yellow, the fifth segment with a stem one-third the length of the cylindrical basal enlargement, the latter with a length two and one-fourth times its diameter. Terminal segment more slender, with a length two and a half times its diameter and apically with a short, knob-like appendage. Ovipositor short, the basal lobe broad and broadly rounded apically. Other characters practically as in the male.

Described from dried specimens and others in balsam mounts.

Types deposited in the collections of the United States National Museum and co-types in the insect collections of the University of California.

A NEW CALIFORNIA EPICAUTA

(Coleoptera, Meloidæ)

BY J. O. MARTIN

California Academy of Sciences

In the spring of 1931, while on a collecting trip to the Death Valley region, Mr. Joseph R. Slevin, curator of herpetology of the California Academy of Sciences, collected in the Panamint Valley, a series of nine specimens of a very striking Epicauta which appears to be undescribed. These beetles were taken on the flowers of a thorny tree, probably a mesquite.

Epicauta magnomaculata Martin, n. sp.

Body black, scarcely shining, closely punctate and covered with a decumbent cinerous pile of a slightly yellowish cast. Head slightly wider than base of thorax, closely punctate with cinerous pile. Toward the vertex the median suture along which the pile is parted is broadened somewhat and without pile. Thorax campanulate, a very little longer than wide, more coarsely punctate than the head, with two impunctate bare areas, one each side of the median line which is widened like the head suture to an impunctate area between the spots. Elytra not noticeably widened behind as in *maculata*, closely punctate, cinero-pubescent, with irregularly disposed denuded impunctate areas forming black spots, the average of which are equal in diameter to the distal extremity of the tibia. Toward the base and in the costal region these spots decrease in size and are nearer together. Abdominal segments less distinctly maculate than in *maculata* owing to encroachment of the pile on the bare areas. In the male on the second abdominal segment near the center of the hind edge, there is a black spot which is covered with black hairs, on the third, fourth, and fifth segments a similar but larger spot appears, these markings becoming larger and triangular caudad. Tip of the sixth segment black, with black hairs, and distinctly notched.

These median abdominal spots are lacking in the female which has on the abdomen a mixture of black and cinerous hairs, giving the female abdomen a slightly darker cast than that of the male. Length of the type, 20 mm. with a width of 5 mm.

This species is strikingly different from its nearest relative *maculata* Say, being narrower behind, with the elytra less convex transversely and longitudinally, the shape being more nearly that of *vittata* Fab. The black spots of the elytra are larger and farther apart than in *maculata* from which it also differs in its bimaculate thorax.

The type male (No. 2755) and the allotype female (No. 2757) are in the collection of the California Academy of Sciences. Paratypes are also in the same collection. The specimens were presented to the Academy by Mr. Joseph R. Slevin, curator of herpetology, and were collected at Ballarat, Inyo County, California, in the Panamint Valley, May, 1931.

A Locality for Argynnis Behrensii Edws.

On June 26 I made a short pleasure trip into the mountains of Mendocino County and, as usual, I took my net along with me.

About a mile north of the little town of Navarro, where we stopped for lunch, I took two male Argynnis but paid no further attention to them and, as I am very much in arrears with my setting, they were stored with the other specimens until I had an opportunity to set them.

On June 9 my friend, J. D. Gunder, wrote me to try the mountains east of Point Arena for *Argynnis behrensii*. Time would not then permit it. Somehow I did not stop to think that these two Argynnis might be the rare species he had reference to, until, on the 11th of July, Mr. Gunder wrote again and told me that Mr. Cottle had found this species near Point Arena.

About this time I started mounting my catch from the Navarro trip. Later, in July, when a friend offered me the opportunity of going with him on a short trip up the Coast, I once more worked the mountains east of Point Arena and succeeded in securing a few more specimens, but I was a trifle late for them. I set these immediately and compared them with the specimens from my previous trip and found them to be the same species. Evidently its range is not confined to the Coast side of the mountains, and future research will be necessary to actually establish its territory.

Mr. Gunder is to be commended for digging into the old records and thereby being instrumental in the rediscovery of species, traces of which have been more or less lost.—R. F. Sternitzky.

NEW COLEOPTERA FROM CALIFORNIA

BY R. E. BARRETT

Saticoy, California

Dendroides pacificus Barrett, n. sp.

Elongate, slender, subparallel. Head and mouth parts, first two segments of antennæ, prothorax, scutellum, underside of body and legs rufotestaceous, rest of body piceous. Head rather finely punctate; eyes large, separated by width of scutellum; antennæ eleven-segmented with segments three to ten ramose, ramus of each segment arising at distal end, last segment as long as the three preceding segments combined. Pronotum smooth and shining, three-fourths as wide as long, arcuately narrowed in front. Elytra coarsely and closely punctate with short semi-erect pubescence arising from the punctures. Undersurface of body and legs finely punctate and pubescent; fifth segment of abdomen broadly emarginate, sixth obtusely emarginate, so that angle formed at center is slightly greater than 90 degrees. Length 12.5 mm.; breadth 4 mm.

In Horn's review of *Dendroides* (1888) this species runs to *picipes* from which it may readily be separated by the color of the head, first two segments of the antennæ, and legs and by the shape of the sixth abdominal segment.

This species is described from a specimen which was reared from a larva collected at Inverness, Marin County, California, March 20, 1926. The larva was taken in the rotten trunk of red alder, *Alnus rubra* Bong., which was also inhabited by *Platycerus oregonensis* Westw. The adult emerged April 2, 1926. Type in my collection.

Temnochila sonorana Barrett n. sp.

Body elongate-oblong, upper surface piceous. Head with faint frontal impression, coarsely punctate, mentum with a fulvous tuft of hairs; palpi brown; mandibles with a reddish tinge, not as coarsely punctate as head; antennæ brown, basal segment coarsely punctate. Scutellum small, transverse. Pronotum with complete lateral and basal margin, basal angles well defined, coarsely punctate, sides evenly narrowed toward base, not quite as wide as long. Elytra margined at base, alutaceous, coarsely punctate at base less so posteriorly, punctures in rows, striæ feeble and incomplete, humeral angles distinct, wider at base than base of thorax. Undersurface of abdomen dark reddish brown, prothorax slightly darker, head piceous, coarsely punctate except abdomen which is finely closely punctate. Legs reddish brown. Length 10 to 17 mm.; breadth 3 to 7 mm.

Holotype, No. 3612, in the Museum of the California Academy of Sciences, from Coachella, Riverside County, California. Five paratypes collected at the same locality and a single paratype from Palm Springs in the same county. The holotype and four of the paratypes including the Palm Springs specimen were collected by Dr. E. C. Van Dyke and are in his collection. The other two paratypes were collected by me under the bark of mesquite, *Prosopis juliflora glandulosa* (Torr.).

Aphodius sparsus sheldoni Barrett n. subsp.

Color dark reddish brown. Median portion of pronotum not as heavily punctate, striæ not as deep or as coarsely punctate, elytral intervals not as convex as in typical *sparsus*. Length from 5 to 6 mm. while *sparsus* varies in length from 6 to 8 mm. although occasional depauperated individuals are smaller. The difference in color appears to be constant if recently emerged and not fully pigmented *sparsus* are excluded.

Holotype, No. 3613, in the Museum of the California Academy of Sciences, from Carpinteria, Santa Barbara County, California. Numerous paratypes in my collection from various parts of Santa Barbara, Ventura and Los Angeles Counties, California. All specimens were taken in nests of the wood rat, *Neotoma*.

From field experience with *sparsus* over a large area it appears that the species is composed of a number of complexes which are probably due to isolation imposed by its habitat.

I take pleasure in naming this subspecies after Mr. H. B. Sheldon.

Argias Wanted

The collection of dragonflies in the Museum of Zoölogy, University of Michigan, contains long series of Argias representing collections accumulated over a quarter of a century, about ten thousand specimens. Support has been obtained for a revisional study of the genus, and I should like to study other available Argias. Material loaned me will be returned intact to the owner at the completion of the study.—E. B. Williamson, Research Associate, Division of Insects.

BEES OF THE GENUS ANDRENA FROM CALIFORNIA

BY T. D. A. COCKERELL

I am greatly indebted to Mr. P. H. Timberlake for the opportunity to study and describe some of the beautiful and interesting species of *Andrena* which he has obtained in California. I am also able to correct my interpretation of *A. cleodora.*

Andrena cleodora Viereck

Mr. Timberlake sends a pair which he collected in General Grant Park, California, 1929. The female is from *Ceanothus integerrimus,* June 27; the male from *Senecio lugens,* June 26. Mr. Timberlake compared the female with Viereck's type of *A. cleodora* and found no difference. He suggests that my *A. lutzi,* 1931, from Wyoming, is the same species. This is indeed the case; the Californian form differs a little in the darker stigma, and sternites not testaceous-margined. I had identified as *A. cleodora* a quite distinct species with black hair on thorax above, which agreed perfectly with Viereck's description, which makes no mention of the pubescence whatever. It is urgently necessary to redescribe Viereck's species of *Andrena* from the types in order that they may be understood, and correctly placed in the series.

The male of *A. cleodora* is about or hardly 10 mm. long, anterior wing slightly over 7 mm. Hair of head and thorax long and abundant, rather light but dull yellowish fulvous, not mixed with black; facial quadrangle broader than long; mandibles bidentate, faintly rufescent at apex, not elongated or curved; cheeks broad and hairy, but not specially modified; front and vertex dull; clypeus densely punctured with a smooth, raised median line; antennæ long, reaching metathorax, the flagellum stout, the joints submoniliform; third antennal joint seen from above intense black, a little longer than fourth; mesothorax and scutellum dull; area of metathorax large with strong rugæ as in female; tegulæ shining black; wings brownish; stigma large, dark reddish brown; legs with pale fulvous hair; tarsi rufescent at apex; tergites 2 to 4 with the smooth, depressed part about as wide in middle as the punctured part; stipites very broad, and truncate at end. The outer face hollowed.

Andrena melanodora Cockerell, n. sp.

Female (type). Length, 11 mm.; head and thorax black, with entirely black hair, stiff and short on thorax above, but erect and not

felt-like; abdomen above shining dark green and purple; legs black, with black hair; wings strongly brownish, really dilute fuliginous, with reddish black stigma and dark nervures. Structurally, this species agrees closely with *A. cleodora*, having the abdominal depressions equally extensive, going almost to the base of the tergites. The rugosopunctate clypeus, with more or less of a smooth median line, is quite the same. The broad facial foveæ, sculpture of vertex and front and the antennæ, seem to afford no distinctions. The wing venation and structure of thorax, legs and abdomen, all agree. Thus the insect is, in effect, a black-haired *A. cleodora*, though the apical plate of abdomen is certainly larger and more rounded at end, and the wings seem to be appreciably redder.

The male is also like that of *A. cleodora* in almost every respect except the pubescence; it has the same broad truncate stipites. The wings are somewhat clearer and the second cubital cell is broader. The face, cheeks, pleura and sides of metathorax have very long black, or rusty-black hair; occiput and thorax above with long white hair; legs and abdomen (which is strongly purplish) with black hair, in lateral view appearing as median tufts on tergites 2 and 4, and these tergites have narrow pallid shining hind margins.

In the series of Trachandrena these species fall with *A. politissima* Ckll. (Idaho) and *A. nuda* Rob. (eastern states), but are peculiar for the beautiful metallic abdomen.

The type of *A. melandora* is a female from southern California (marked W, which I understand to be Mount Wilson), collected by Mr. Davidson. Another female is from Kenworthy, San Jacinto mountains, 5000 feet, June 10 (F. Grinnell, Jr.). Mr. Timberlake sends a female from Big Pines Camp, California, June 16, 1928 (O. H. Swezey), and a male from Mount San Antonio, July 2, 1911, at the summit (Timberlake).

Andrena zygadeni Cockerell, n. sp.

Female (type). Length about 11.5 to 12.5 mm., anterior wing, 9; black, rather robust, with red hair, very bright fox-red on face, thorax above and abdomen, paler on legs; facial quadrangle much broader than long; malar space linear; mandibles obscurely reddish in middle, bidentate, but the inner tooth short and rudimentary; process of labrum very broadly truncate; clypeus so densely covered with hair that it is necessary to scrape it off to see the surface, which is dull and densely and minutely punctured, without a smooth median line, but a polished band along upper margin; facial foveæ moderately broad, not extending halfway to antennæ, densely clothed with light red hair, not extending very far down the orbits; antennæ short, third joint slightly longer than next two together, these, however, being very short; flagellum thick, black, or obscurely reddish beneath; mesothorax and scutellum dull, with a minutely rugulose sur-

face, densely covered with erect hair; area of metathorax triangular, dull, hardly defined, without evident sculpture; tegulæ rufotestaceous; wings reddish hyaline, dusky at apex; stigma large, dull ferruginous, without a dark margin, nervures ferruginous; basal nervure meeting nervulus; second cubital cell very broad, moderately narrowed above, receiving first recurrent nervure about middle; legs black with small joints of tarsi red; hair of tibial scopa plumose posteriorly, but anteriorly long and almost entirely simple; abdomen dull, with excessively fine punctures, the first tergite shining toward base; the tergites have broad loose bright red hair-bands, but the surface generally is covered with erect red hair; second tergite in middle depressed hardly a third; apex of abdomen appearing briefly emarginate.

Males smaller and more slender, 10 to 10.5 mm. long; pubescence bright red as in female, or varying to pale yellowish; antennæ entirely black, third joint longer than fourth, but not nearly as long as fourth and fifth together; mandibles curved, bidentate, not noticeably modified; second cubital cell narrower; stipites with a narrow black base and a broad yellow truncate end, the broadly pallid apical part of the genitalia strongly contrasting with the rest.

Type from Lake Hodges, San Diego County, California, at flowers of *Zygadenus,* March 9, 1932 (C. M. Dammers). Many specimens taken, all on *Zygadenus.* Also obtained by the same collector at Gavilan, near Riverside, March 8, 1931, at *Zygadenus.*

In my key to species with thorax above (or at least scutellum) with ferruginous hair, and abdomen with distinct hair-bands (females) it falls next to *A. auricoma,* as follows:

Abdominal tergites with bands of erect fulvous or red hair; facial foveæ red or fulvous 1
Abdominal bands otherwise 2
1. Smaller; mesothorax polished on disk, facial foveæ narrower ..... *auricoma* Smith
Larger, mesothorax dull ..... *zygadeni* Ckll.
2. Clypeus strongly convex, disk highly polished and impunctate ..... *pronitens* Ckll.
Clypeus otherwise 3
3. Hind tibiæ greatly broadened at end; abdomen dull with compact, clear-cut fulvous hair-bands ..... *opaciventris* Ckll.
Otherwise 4
4. Very small; first recurrent nervure about middle of second cubital cell ..... *beckeri* Ckll.
Larger; first recurrent nervure beyond middle of second cubital cell 5
5. Hair-bands of abdomen narrow and compact; fimbria dark ..... *brevipalpis* Ckll.

Bands of abdomen with hair longer and not compact; fimbria light 6

6. Fimbria pale chocolate; clypeus shining and strongly punctured; basal nervure falling far short of nervulus.....*viereckі* Ckll.

Fimbria pale fulvous; clypeus duller and not so strongly punctured; basal nervure meeting nervulus.....*brachycarpæ* Vier. and Ckll.

The male does not run close to anything in my tables. The lightest form has a certain superficial resemblance to *A. mentzeliæ* Ckll., but the latter has clearer wings, with a much paler stigma, much longer mandibles, sides of face highly polished, etc.

The female, on account of the bright red hair, is suggestive of *A. vulpicolor* Ckll., but that flies late in September, and is much larger with the intervals between the abdominal bands not hairy.

Andrena nudimediocornis Viereck

Female. Length about 11 mm., anterior wing 7.7; black, the head and thorax with rather thin, erect, dull white hair, long and shining, clear white on occiput; head broad, facial quadrangle much broader than long, eyes rather small; mandibles ordinary, curved, bidentate, entirely black; malar space linear; process of labrum broadly truncate; clypeus entirely dull, the surface appearing minutely granular; a shining spot near lower end of each eye anteriorly; an arcuate shining line bounding upper margin of clypeus; front dull, minutely striate; facial foveæ moderately broad, greyish white, separated from the orbit by a rather broad, shining, sparsely punctured band; antennæ black, third joint long, longer than next two combined; cheeks broad and rounded; mesothorax and scutellum dull, except that there is a shining line along anterior margin of scutellum; area of metathorax dull, poorly defined, without evident sculpture, though there are faint traces of plicæ in the middle; tegulæ large, brownish black; wings brownish hyaline, stigma large but rather narrow, reddish black; nervures dark; basal nervure meeting intercubitus; second cubital cell broad, receiving recurrent nervure about middle; legs ordinary, the hind tibiæ broad, with a black strongly plumose scopa; anterior femora with long white hair; hair of hind femora greyish; hair on inner side of tarsi black; spurs red; abdomen finely punctured, shining basally, the apical part duller; first tergite with distinct punctures, not nearly so small and dense as on second, on third they are smaller and denser than on second; three narrow clear white hair-bands on tergites 2 to 4, that on second more or less weak in middle; fifth tergite and apex with dense brownish black hair; disks of tergites not evidently hairy; venter with dark, sooty hair.

Males much smaller and more slender, length about 8.7 mm.; mandibles long, strongly bidentate; face with a copious beard of long pure white hair; head very broad, cheeks broad but rounded, antennæ only moderately long, third joint about as long as next two together; cheeks and mesopleura with long pure white hair, and much of the same (nowhere mixed with black) on vertex and dorsum of thorax; basal nervure sometimes going distinctly basad of nervulus; hair of legs all white, except that it is pale rufous on inner side of tarsi; abdomen with long white hair on first tergite, but the bands are only represented by thin long hair and are not distinct; tergites 2 to 5 with linear shining pale hind margins; apical hair white, very faintly stained with reddish. In both sexes the depressed part of second tergite is very short. The stipites have a long neck and a laterally expanded subtriangular apical portion.

Gavilan, California, March 28, 1932, at flowers of *Lomatium dasycarpum*, collected by Timberlake. Many specimens were taken, all at the same flowers.

In my table of medium-sized species with conspicuous hair-bands, the female falls in a group with the caudal fimbria dark, as follows:

Wings very dark; abdominal bands fulvous tinted; basal nervure going basad of nervulus ..... *fulvipennis* Smith

Wings not or not very dark; basal nervure meeting or (some *sapellonis*) falling short of nervules 1

1. Disk of mesothorax with black hair ..... *heterodoxa* Ckll.
   Disk of mesothorax without black hair 2
2. Clypeus shining; abdominal hair-bands broad ..... *electrica* Casad and Ckll.
   Clypeus not shining 3
3. Clypeus with a median ridge; stigma pale red ..... *sapellonis* Ckll.
   Clypeus with no median ridge; stigma very dark ..... *nudimediocornis* Vier.

The male falls in my table in the vicinity of *A. placida* Sm. (as det. by Viereck) and *A. nigritarsus* Vier. and Ckll., both of which are smaller and less robust. In *A. placida* the stigma is clear orange, in *A. nigritarsis* it is dusky red. In another table of males *A. nudimediocornis* falls with those having the tarsi dark and the sides of face without black hair, and then goes next to *A. navajorum* Vier. and Ckll., which has much longer antennæ and is otherwise very different. Both sexes run more or less readily to *A. campanulæ* Vier. and Ckll., which is in fact a similar species. The female *A. campanulæ* has a much narrower face, and white scopa on hind tibiæ.

OBSERVATIONS ON THE GENUS *RETICULITERMES* HOLMGREN

BY A. L. PICKENS
University of California, Berkeley, California

The following observations were made chiefly at the University of California between the autumn of 1928 and the early part of the present year, 1932. Some of the findings appear to differ in important aspects from those of previous workers.

The genus *Reticulitermes* occurs in a broken circle around the earth, almost altogether in the temperate zone, except for extensions along mountain ranges or cooler seacoasts. The range for the genus appears to be limited on the north by temperatures too cool for breeding, and on the south by temperatures too warm, queens being inclined to an æstival as well as a hibernal surcease from egg laying. Ranges for the species seem to be determined also by differences in humidity. In the Nearctic the ranges of the three chief species correspond roughly to the three subregions of Wallace's "Geographical Distribution of Animals" (1876). Comparative studies show that even the dry wood termite *Kalotermes minor* Hagen is most abundant near mild foggy seashores, somewhat common inland near large streams and lakes, and absent from the dryer areas, decrease being proportional to moisture content in the air.

Observations made chiefly on *Reticulitermes hesperus* Banks bring out the following points: Infestation rarely takes place through flying pairs, but usually occurs through the ground, from insects which, after migrating, have a supplementary reproductive pair bred from among their number.

The rarely established primary colony, judging from laboratory and field experience, develops very slowly, the most successful colonies being aggregates of the offspring of several pairs, eventually collected under a single pair, that survived the conflict incident to such groupings.

Colony increase in the primary colony, as observed in the laboratory and field, is a very slow process, few eggs being deposited the first year, usually about twelve, and these eggs require on the average more than fifty days for hatching. The *first* eggs hatch in little more than a month after laying, the periods for the others increasing gradually until the last egg may

require almost four months. The worker attains maturity by a series of instars lasting, respectively, approximately one-half, one, two, four, eight and apparently sixteen months. In soldiers and alates the last instar is shortened by several months, and soldiers appear to omit one or more final instars depending on their adult size. First soldiers in primary colonies attain maturity much earlier, and are much smaller in size than soldiers from larger colonies.

The chief factor in general population increase seems to be the brachypterous secondary queen, which reaches the egg-laying period earlier, and lays far more abundantly than either the primary reproductive, or the apterous form, except in rare cases where apterous reproductives have an abundance of retainers. Conjecture both on the part of popular and scientific writers has exaggerated the importance of the winged reproductives.

Theoretically, the queen appears to inhibit passively the full development of additional queens by some secretion from her body on which her attendants feed. Nymphs of groups isolated with reproductives do not develop into functional reproductives, while secondary reproductives do develop in about eight weeks in groups of nymphs and workers isolated without reproductives. Alates appear to develop in a part of the colony at a distance from the cells the queen chiefly inhabits. Every step of intergradation between workers and alates occurs, and some, at least, of the workers appear to be inhibited reproductives capable of developing into apterous queens. Those nymphs most closely in attendance on the queen would appear to be most completely inhibited and to develop into workers.

In the case of a soldier a difference in the egg is indicated. Soldier eggs appear to be laid at considerable intervals after the main group of eggs, and to require longer periods for hatching. Heretofore the inclination has been to classify undifferentiated nymphs into a sterile soldier-worker group and a fertile reproductive group. Indications appear to warrant a new grouping. It would seem better to presuppose a soldier group and a worker-reproductive group, workers supposedly having evolved from primary reproductives through brachypterous reproductives.

Periods of swarming in the eastern humid states appear to be controlled by rise of temperature in the spring, and in the dryer western states by rise in the amount of moisture during autumn. *Reticulitermes hesperus* and its congener *R. tibialis* Banks are strikingly similar in markings and general habits of the colony. The chief difference lies in geographical distribution, reaction to moisture content of soil, and in the degree of pugnacity in the various castes of the two species.

Fertile crossings of *R. hesperus* males with *R. tibialis* females have been accomplished in the laboratory, as has also the fertile crossing of the unpigmented primary with the pigmented in *R. hesperus*.

Numerous experiments fail to show a single case of adoption of a foreign pair, either primary or supplementary, by a group from another colony. Rather they are viciously attacked, their bodies chewed up, mixed with wood pulp and buried on the floor of the burrow, a rude approximation of the embalming process pursued by bees with certain invaders.

Egg numbers in the first clutch of a primary colony run from four to twelve or fifteen. Fertilization of the egg takes place in the female's body. Copulation may occur as early as the next day after swarming, and recurrences take place for months afterwards. Thus the earliest eggs have appeared in twelve days after the swarming of the pair, while with other pairs no eggs were found until the following spring.

There appears to have been a marked increase of *Reticulitermes* population noticeable in recent years, chiefly in the regions of *R. hesperus*. This has been occasioned by the favorable temperature, moisture, and food supplied by modern building, landscaping and other developmental methods. Preventive methods along the lines of proper construction rather than resort to poisons and insecticides appears advisable.

The above constitutes a digest of three papers on *Reticulitermes* read before the meetings of the Association for the Advancement of Science and the Western Society of Naturalists. A detailed report will be published later.

A NEW AULETES FROM CALIFORNIA

(Curculionidæ, Coleoptera)

BY E. C. ZIMMERMAN
Oakland, California

Auletes mariposæ Zimmerman, n. sp.

Small, robust, shining, submetallic, greenish blue, darker beneath, prothorax and head usually with violaceous reflections, antennæ black; pile sparse, suberect, rather long, white.

Head wider than long, sparsely and coarsely punctate, with a median frontal carina which is divergent anteriorly to form a number of small carinæ on the base of the beak, less pronounced or obsolete in the female, rugose beneath, at the sides and at the base; eyes very prominent; beak stout, longer than prothorax, finely and sparsely punctate above, sides with large, deep, broad punctures; scrobes broad, beginning near middle of the beak; antennæ inserted at basal third, club large, loosely articulated, densely pubescent, shorter than the preceding portion of the antenna, the third segment acute, triangular. Prothorax wider than long, apex much narrower than base, disk smooth or sparsely punctured, more coarsely and closely in front and at sides, a vague longitudinal carina often present. Elytra two-fifths wider than prothorax, one-fourth longer than wide, each elytron rounded at its apex, lateral margins subparallel, disk unevenly, irregularly punctate. Posterior margin of first ventral segment slightly bisinuate, the following segments with straight margins. Abdomen moderately, coarsely punctate. Tarsal claws armed with a large tooth. Length 1.5 mm. to 2.5 mm., from the base of rostrum to the apex of the elytra; breadth .8 mm. to 1.5 mm.

The female differs from the male in being larger, more robust, in having the median carina of the head much less developed or entirely absent, and in having a shallow impression on the posterior margin of the first ventral segment.

Holotype, male (No. 3623, Mus. Calif. Acad. Sci.). Allotype, female (No. 3624, Mus. Calif. Acad. Sci.), and thirteen paratypes taken by the author at Crane Flat, Mariposa County, Yosemite National Park, California, on August 2, 1930. Designated paratypes in Dr. E. C. Van Dyke's collection deposited in the Museum, California Academy of Sciences; the remainder in the author's collection.

In Pierce's key [1] this species would come between *rufipennis* Pierce, and *viridis* Pierce. It most closely resembles *Auletes viridis* Pierce. However, the general facies of *mariposæ* is

1 Pierce, Proc. U. S. Natl. Mus., Vol. 37, 1909, pp. 326-327.

quite distinct. It may be distinguished from *A. viridis* as follows: greenish blue instead of green, larger, more robust, the pile whiter, more erect, longer and sparser, the antennæ inserted at the basal third of the beak, not at the basal fourth as in *viridis,* the club shorter than the preceding portion of the antenna and loosely articulated, the two being equal in *viridis* and the club more compact, the sutures between the segments less deeply impressed, and the apical segment more rounded and not acute as in *mariposæ,* the first ventral segment slightly bisinuate on its posterior margin instead of straight, and the punctation not as coarse and close as in *viridis.*

Mr. L. L. Buchanan, who very kindly compared *mariposæ* with the type of *viridis* writes the following interesting note: "The antenna of *viridis* is peculiar in that the funicle is only six-segmented in three of the four specimens, the third and fourth segments being fused. The type specimen has a seven-jointed funicle, although the suture between segments three and four does not seem to be as deep as usual."

I have compared *mariposæ* with two specimens of *viridis* found in the Koebele collection at the California Academy of Sciences. These specimens were collected in Siskiyou County, and are thus undoubtedly of the series from which the type of *viridis* was selected.

Note on the Antenna and Frons of Larvæ of the Curculionidæ

To those interested in classification characters presented by larvæ of this family, the suggestion is made that Otiorhynchine forms may be separated from all others, first by shape of the apical antennal segment, and secondly, by the absence of a median frontal carina. All of the information the writer has been able to gather up to the present indicates that Otiorhynchine larvæ have a transversely oval and usually rather large apical antennal segment. In the remainder of the family this segment is quite small as compared to the basal part, is round, and often conical. Criticism of these suggestions will be welcomed.—H. H. Keifer, California Department of Agriculture, Sacramento, California.

A NEW ERYTHRONEURA RELATED TO ERYTHRONEURA RUBRICATA (VAN D.)

(Homoptera, Cicadellidæ)

BY R. H. BEAMER [1]

In visiting various portions of Florida in 1930 on a biological survey trip for the Snow Entomological Collection the grape leafhopper *Erythroneura rubricata* (Van D.) was found to be one of the most common species. The recording of several host plants and the describing of a new closely related species is the object of the present paper.

ERYTHRONEURA RUBRICATA (Van D.)

Typhlocyba rubricata Van Duzee, E. P., Bul. Buf. Soc. Nat. Sc., IX, p. 229, 1909.

Vertex and scutellum dark yellow, remainder of dorsum coppery red, at least in summer specimens. A pale yellow vitta along costa. Face and sternum yellow, venter of abdomen darker.

Genitalia. Pygofer hook single, short, heavy at base, tapering rapidly to narrow, almost parallel-sided, slightly curved shaft. Style with medium foot; heel small but distinct; base of foot almost straight; anterior point short, slightly less than a right angle; posterior point about as long as foot, narrow, projecting at about right angles. Oedagus of less than medium length, more than half as wide as long at base; in dorsal view wide at base, narrowing almost to tip, where it ends in an arrow-shaped head with outer corners of arrowhead projecting backward as sharp spines or hooks.

Three hundred and sixty-six specimens of this species were taken as follows: From *Ascyrum hypericoides* (L.) at Hilliard, Florida; Suwanee Springs, Florida; Wildwood, Florida; Branford, Florida; Inverness, Florida; and Fort Meade, Florida. From *Hypericum densiflorum* Pursh., at Hilliard, Florida. From *Hypericum aspalathoides* Willd. at Loughman, Florida.

Erythroneura mixta Beamer, n. sp.

Resembles *Erythroneura rubricata* (Van D.) in general color of dorsum. It may be separated from that species by the dark face and sternum in both winter and summer forms and usually by the brownish yellow dorsal coloring of the summer

1 Contribution from the Department of Entomology, University of Kansas, Lawrence, Kansas.

forms instead of the coppery red of *E. rubricata* (Van D.). The œdagus of the male of *E. mixta* is slender with three hooks at tip while that of *E. rubricata* is broad and flat with two large recurving hooks.

Summer specimens. General ground color lemon yellow darkened to light brown on pronotum, clavus and most of tegmen. Dark dorsum of abdomen lends to this median longitudinal darker area. In many specimens pronotum and scutellum have faint tinge of pink. Venter generally of about same color as dorsum or darker. Legs quite dark, spines of hind tibia fuscous.

Winter specimens. General ground color of dorsum reddish brown to reddish fuscous, lighter toward margins. Venter quite dark, almost black, in some specimens. Spines black.

Genitalia. Pygofer hook single, short, heavy at base, tapering to a rather sharp point, usually more slender than in *E. rubricata.* Style with narrow foot of medium length; heel small but prominent; base almost straight; anterior point short, less than a right angle, not quite so long as foot is wide; posterior point straight, about as long as foot, quite narrow and sharp pointed. Oedagus short, slightly curved in lateral view, tapering from base to tip, where it ends in three narrow, curved, equidistant processes which are about as long as œdagus is wide, extending at right angles to shaft.

Holotype, male, allotype, female, and numerous paratypes, Plant City, Florida, August 15, 1930, R. H. Beamer. Paratype males and females, Ponce de Leon, Florida, P. W. Oman, December 31, 1931. Types deposited in Snow Entomological Collection, paratypes in United States National Museum.

The specimens from Plant City, Florida, were taken on *Hypericum fasciculatum* Lam. The plants were growing about a pool of water located in a wild grass meadow. The Ponce de Leon specimens were taken on *Hypericum aspalathoides* Willd.

A NEW FEATURE

As a measure of economy it has been deemed advisable to publish the minutes of the Pacific Coast Entomological Society in the PAN-PACIFIC ENTOMOLOGIST. The Publication Committee felt this would be better than raising the price of the journal. When times are better and subscriptions come in more promptly separate publications of the minutes can be resumed. In the meantime it is hoped our subscribers will find something of interest in these minutes.—Editor.

Proceedings of the Pacific Coast Entomological Society

One Hundred and Twenty-Second Meeting

The 122nd meeting of the Society was called to order in Room 10 of the San Francisco Ferry Building at 8:30 p. m., September 6, 1930, President Van Dyke in the chair. Twenty members and six visitors present. In the absence of the secretary, Mr. R. F. Sternitzky was asked to act as secretary pro tem. The reading of the minutes and other current business was postponed until the next meeting.

Dr. E. C. Van Dyke introduced Mr. Eaton of Cornell University, who has done work under Prof. Forbes, Mr. H. H. Caldwell from the University of Arizona, Mr. N. S. Noble, an economic entomologist from Australia, Mr. Arthur D. Borden, who worked with Dr. Kellogg for some time, and Mr. Theron Davis.

Mr. Robert Usinger proposed Mr. Don Kelley for membership and Mr. C. Gorton Linsley proposed Mr. E. C. Zimmerman. Both were unanimously elected.

Dr. Van Dyke reported the death of Mrs. Anna Batsford Comstock and of Mr. Norman R. Gunn, the latter one of the active younger members of the Society, who was drowned while on a collecting trip to northern California.

This being the annual meeting of the Society the President called upon the members present for a report on their work during the summer:

Mr. E. P. Van Duzee reported a hasty collecting trip by automobile through the "Mother Lode" country from Grass Valley and Downieville through Placerville and Jackson to Sonora and Long Barn. Also a number of shorter trips, one to Clear Lake being most productive.

Mr. J. E. Cottle reported on three successful trips [1] after butterflies.

Mr. Robert Wind reported an extensive collecting trip to the Grand Canyon, the Yellowstone National Park, and the Grand Teton. At the latter place he took many fine specimens, including the new race of *Heodes heteronea* recently described by Dr. Klotz.

Mr. L. W. Saylor reported good collecting in the San Diego region.

Mr. Robert Usinger spoke briefly of collecting Hemiptera in the Grand Canyon and other National Parks. He met a number of entomologists and netted a good deal of interesting material, among which were some Yucca borers.

Mr. E. C. Zimmerman worked at Mather and Hetch Hetchy, but found the season too dry for good collecting.

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[1] An interesting account of these appears in Vol. VIII, No. 1, of the Pan-Pacific Entomologist.

Mr. Michael Douderoff also found the season too late in the Mount Shasta region and moved on to the district about Crater Lake. At Diamond Lake, Oregon, he captured three forms of *Euphydryas, editha, aurilacus edithana* and *colonia,* and reported that *edithana* was mating with *aurilacus* on several occasions. *Euphydryas colon, Oeneis nevadensis* and *Melitæa segregata* were also captured at Diamond Lake. A less successful trip to Mendocino County after *Argynnis behrensi* was also reported.

Mr. R. F. Blackwelder spent a part of the winter and spring in Panama collecting beetles. He reported a very successful trip, bringing home about 15,000 insects.

Dr. F. E. Blaisdell told of a trip to Yosemite Valley. He took a good series of *Coniontis rotundicollis* among moist pine needles at the foot of the Bridal Veil Fall. Many Dendroctonus were observed flying in the evening and large numbers of Buprestids were beaten from the Iris in the meadows.

Mr. Howard Hinton collected in the Placerville district, taking several specimens of a rare Valgus on dead leaves. Their larvæ were found in dead wood associated with termites. Many other interesting insects were taken.

Mr. Gorton Linsley spent from the first of June to the middle of July in Arizona and Texas. In Arizona the season was too early for good collecting, but many beetles were taken about store windows, where they had been attracted by the light. In Texas the season proved just right, especially at Brownsville, where there is a subtropical flora. About 10,000 specimens of beetles were taken.

Mr. A. T. MacClay reported taking a trip through the Pinoche country with Dr. Van Dyke, Mr. Linsley and Mr. Zimmermann. At Merced they found the country too dry, so they proceeded to Bakersfield and on up the Kern River to Havilah, where they were too early for good work. Going on to the Greenhorn Mountains they found it still too early but conditions excellent for later work. At Sequoia National Park they met with excellent success. A second trip to Fallen Leaf Lake and the district toward Meyers yielded some good species.

Mr. G. R. Wilson gave a short but interesting talk on the work of the quarantine office of the State Department of Agriculture. Dr. H. E. Burke followed with a short report on his work, and observations on various species of thrips found in the Palo Alto district. Mr. J. B. Steinweden gave a short synopsis of various local collecting trips in the Bay region and exhibited several interesting species of thrips.

Dr. Van Dyke reported on an extensive trip he took with Mrs. Van Dyke. They went by way of Truckee to Steamboat Springs, Nevada, and then across that state to Salt Lake and Provo, Utah, and north to Logan, with a trip through Logan Canyon. From Logan they went to Idaho Falls and on to Yellowstone National Park, where collecting proved excellent. After visiting the Geyser

Basin they turned south to Yellowstone Lake and the Great Teton, then turning north they visited the Yellowstone Gorge and Mammoth Hot Springs, where many Lepidoptera were taken, but it proved to be too early for Coleoptera. From Yellowstone Park they went to the Glacier National Park and across Montana and Idaho to Spokane and Wenatchee, Washington, over Stevens Pass, where the collecting was excellent. It was interesting to note that the same species were taken in the sagebrush country, no matter where it was located.

Mr. R. H. Sternitzky reported taking over forty *Argynnis clemenci* at Atascadero. At Moro Beach great numbers of *Melitæa palla* were flocking about the beach verbena in April, and upon returning in June he found a second brood flying at the same place. In the Mojave Desert *Anthocharis cethura* and *deserti* were taken during early April. At the beginning of May a long series of *Euphydryas rubicunda* was taken, and *Argynnis malcomi* and a number of other species were found at Mammoth Lake and vicinity in July. Several other trips were taken to various parts of California and about 2500 specimens were secured during the season. He also reported a visit to Los Angeles, where he met a number of the local entomologists there.

After a short general discussion the meeting adjourned.

R. F. Sternitzky, *Secretary Pro Tem.*

The One Hundred and Twenty-Third Meeting

The 123d meeting of the Pacific Coast Entomological Society was held Saturday evening, December 6, 1930, at eight o'clock in the rooms of the California State Department of Agriculture, Room 10, Ferry Building, San Francisco. Ten members and three visitors were present, Dr. Van Dyke in the chair. The minutes of the three preceding meetings and the Treasurer's report were read and approved. The Secretary then read a communication from Mr. Fred C. Hadden of the Philippine Agricultural College enclosing $50 in payment for a life membership in the Society. The acceptance of this sum in payment of life membership for Mr. Hadden was moved and seconded and passed by a unanimous vote. By a similar vote a transfer of $50 to the credit of the Pan-Pacific Entomologist was ordered.

President Van Dyke then appointed Prof. R. W. Doane and E. P. Van Duzee as delegates to represent the Society at the affiliation meeting of the Pacific Division of the American Association for the Advancement of Science.

Mr. Van Duzee then proposed the name of Mr. Paul C. Wilbur for membership and he was unanimously elected.

The Chair then named Mr. E. P. Van Duzee, Mr. G. R. Wilson and Mr. Robert Usinger a committee on nominations. Before adjournment they submitted the following list of officers for the ensuing

year: President, Dr. E. C. Van Dyke; for Vice-President, Prof. G. F. Ferris; for Secretary-Treasurer, Mr. J. O. Martin. These officers were duly elected.

Mr. J. B. Steinweden then spoke of the proposed visit of Mr. Stanley Flanders to Australia in search of parasites of the citricola scale, *Coccus pseudomagnoliarum* Kuwana, and called attention to the close relationship existing between this species and the soft brown scale, *Coccus hesperidium* Linn. The citricola scale is primarily a pest of citrus and in the adult stage infests the twigs of its host while the soft brown scale infests ornamental and greenhouse plants as well as citrus and usually is found on the leaves along the midrib. Mr. Flanders and others believe that Australia is the native home of the citrus scale and he is going there to seek its parasites. This scale is often taken in quarantine on citrus from Japan and there is some question if it be not native there.

Mr. J. O. Martin then reported on his trip to Texas. Accompanied by Mr. E. Gorton Linsley he left San Francisco about the first of June. The principal stops for collecting were made at Uvalde, Texas, where a severe rainstorm interfered with collecting, and at Austin, where two days were spent. From there a visit was made to the cave where the unique *Comstockia subterranea* Van Dyke was taken by Dr. John H. Comstock many years ago. Mr. Martin stated that this was his fifth visit to this cave in search of this rare beetle, but he had found no trace of it. A week spent at Brownsville brought good collecting although, owing to the increased citrus culture, the subtropical conditions described by Prof. Wickham had been partially eliminated. On the return, stops for collecting were made in the Chiricahua and Huachuca Mountains, where fair collecting was found.

Mr. Jack Beller then told of the activities of the Los Angeles group of entomologists and spoke of finding a new species of Platynus in the bogs of Washington while working under Dr. Hatch.

Mr. Van Duzee then called attention to the new wing to be added to the buildings of the California Academy of Sciences in which will be the new home of the Department of Entomology. The space allotted to this department is about 30 by 135 feet, or about 4000 square feet of floor space, over four times the space available for this department in the old building. He also called the attention of the members to the list of the butterflies of Los Angeles County by Mr. Jeane D. Gunder, recently published in the Bulletin of the Southern California Academy of Sciences, and reported that Mrs. Joseph Gunn of Berkeley has presented to the Academy the collection of over 3000 butterflies made by her son, the late Norman R. Gunn, a part of which will be utilized in the formation of a collection of determined local species for the use of beginners who may visit the Academy to name their captures.

President Van Dyke then gave an account of some lost species of California insects. *Omus submetallicus* Horn, now known only by

a single specimen in the collection of the Philadelphia Academy of Sciences, that has been searched for by many collectors in all parts of the state but without success. *Calosoma subæneum* Chd., originally taken near Fresno, and *Elaphrus viridis* Horn, labeled simply "California," still remain unrecovered although diligent search has been made for them. Among the butterflies *Cercyonis sthenele* Bdv., taken in the early days in San Francisco, has never been retaken and may have become extinct. It is represented by a single specimen in the Academy collection and a few others in the Barnes collection at the National Museum and in the Holland collection at the Carnegie Museum.

J. O. MARTIN, *Secretary.*

The One Hundred and Twenty-Fourth Meeting

The 124th meeting of the Pacific Coast Entomological Society was held on Saturday evening, February 28, 1931, in the rooms of the California State Department of Agriculture, Room 10, Ferry Building, San Francisco. Nine members and one visitor were in attendance. President Van Dyke in the chair.

After the reading and approval of the minutes Dr. Van Dyke submitted a statement regarding the finances of the PAN-PACIFIC ENTOMOLOGIST and suggested that the Society obligate itself to meet the expense of publishing one quarterly number each year in case the income from subscriptions and other sources should prove insufficient. After discussion this matter was left for consideration at a fuller meeting of the Society.

The Chair then appointed Mr. J. B. Steinweden as chairman of a committee to arrange for the annual field meeting to be held April 19, 1931.

Mr. Donald Kelly proposed the name of Mr. Theron Davis for membership and he was unanimously elected.

Mr. E. P. Van Duzee reported that he had recently rearranged the determined Orthoptera in the collection of the California Academy of Sciences and that the nearly 6000 specimens in the collection represent 460 species, most of which were determined for the Academy by Mr. Morgan Hebard.

Mr. Kelly exhibited specimens of *Tragidion armatum* from the Grand Canyon, and Mr. Elwood Zimmerman exhibited a large female of *Dascyllus davidsoni,* the females of this species being rarely taken.

Dr. L. I. Hewes reported on his summer's butterfly collecting in northern Arizona and southern Utah. He stated that the season in Zion National Park was good from the first of March on, but that in Colorado collecting was best in late June and early July, and in Arizona in late July.

Dr. Van Dyke announced the completion of his paper on the Elateridæ. He discussed the subfamily Plastocerinæ, mentioning

some of the complicated taxonomic problems encountered in this group and exhibited several of his new species and a number of the rare wingless females of Plastocerus and related genera.

Mr. E. R. Leach discussed Cremastocheilus, stating that although he had taken several hundred specimens of this interesting genus he had found but two in ants' nests. Most of his specimens had been taken in sandy or dusty places.

Mr. Van Duzee reported having taken a *Limonius canus* on the San Francisco sand dunes that had "snapped" 1000 times quite regularly during two hours he had held it in his hand for observation. It was released when it showed signs of exhaustion.

Dr. Hewes reported that an eastern man had gotten some interesting photographic results from placing butterfly wings on photographic plates and exposing them to light.

Adjournment.

GORTON LINSLEY, *Acting Secretary.*

The One Hundred and Twenty-Fifth Meeting

The 125th meeting of the Pacific Coast Entomological Society was the annual field meeting and was held at Russellman Park near Clayton, Contra Costa County, on April 19, 1931. This park is situated on the east slope of Mount Diablo. Twenty-nine members and visitors were present.

The weather proved propitious and the collecting conditions good, and many interesting species were taken by the members, among them a large ground-inhabiting Clerid, first taken by Mr. E. C. Zimmerman and later found in numbers by Dr. Van Dyke and Mr. Gorton Linsley. Lunch was served near the swimming tank after which many of the members returned to the collecting grounds for more work in the afternoon.

R. L. USINGER, *Secretary Pro Tem.*

AMBLYCHEILA SCHWARZI

Mr. Charles F. Schaeffer writes me that the Amblycheila I recently reported from California is *schwarzi* W. H. Having since seen a specimen of the true *picolomini* Rche. I am prepared to accept his correction.—J. O. Martin.

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